



# **RPC BROKER TECHNICAL MANUAL**

Version 1.1; Patch XWB\*1.1\*45

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Department of Veterans Affairs  
VistA Health Systems Design & Development (HSD&D)  
Infrastructure and Security Services (ISS)



# Revision History

## Documentation Revisions

The following table displays the revision history for this document. Revisions to the documentation are based on patches and new versions released to the field.

Date	Revision	Description	Author(s)
09/97	1.0	Initial RPC Broker Version 1.1 software release.	Thom Blom and Joel Ivey, Oakland OIFO
04/08/02	2.0	Revised Version for RPC Broker Patch XWB*1.1*13.	Thom Blom and Joel Ivey, Oakland OIFO
05/08/02	3.0	Revised Version for RPC Broker Patch XWB*1.1*26.	Thom Blom and Joel Ivey, Oakland OIFO
02/28/05	4.0	<p>Revised Version for RPC Broker Patches XWB*1.1*35 and 40.</p> <p>Also, reviewed document and edited for the "Data Scrubbing" and the "PDF 508 Compliance" projects.</p> <p><b>Data Scrubbing</b>—Changed all patient/user TEST data to conform to HSD&amp;D standards and conventions as indicated below:</p> <ul style="list-style-type: none"><li>• The first three digits (prefix) of any Social Security Numbers (SSN) start with "000" or "666."</li><li>• Patient or user names are formatted as follows: NHEPATIENT,[N] or NHEUSER,[N] respectively, where the N is a number written out and incremented with each new entry (e.g., NHEPATIENT, ONE, NHEPATIENT, TWO, etc.).</li><li>• Other personal demographic-related data (e.g., addresses, phones, IP addresses, etc.) were also changed to be generic.</li></ul> <p><b>PDF 508 Compliance</b>—The final PDF document was recreated and now supports the minimum requirements to be 508 compliant (i.e., accessibility tags, language selection, alternate text for all images/icons, fully functional Web links, successfully passed Adobe Acrobat Quick Check).</p>	<p>ISS RPC Broker Development Team Oakland, CA Office of Information Field Office (OIFO):</p> <ul style="list-style-type: none"><li>• Project Manager—Jack Schram</li><li>• Developer—Joel Ivey</li><li>• Technical Writer—Thom Blom</li></ul>

Date	Revision	Description	Author(s)
08/29/06	4.1	Added new REMOTE APPLICATION file (#8994.5) to the file list. This file was released with RPC Broker Patch XWB*1.1*45 as part of the Broker Security Enhancement (BSE) Project.	<p>ISS BSE Development Team Oakland, CA and Bay Pines, FL Office of Information Field Office (OIFO):</p> <ul style="list-style-type: none"> <li>• Project Manager—Jean Sheppard</li> <li>• Project Planner—Laura Rowland</li> <li>• Developers—Wally Fort &amp; Joel Ivey</li> <li>• SQA—Matt Alderman</li> <li>• Functional Analyst—Lauren Gorgoglione</li> <li>• Technical Writer—Thom Blom</li> <li>• Security Engineer—Jack Michalek</li> <li>• Release Mangers—Mike Palmer and Lewis Tillis</li> </ul>

**Table i. Documentation revision history**

## Patch Revisions

For the current patch history related to this software, please refer to the Patch Module on FORUM.

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- ISS Program and Project Manager—Larry Weldon
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- Centralized Planner Support Team (CPST)—Laura Rowland
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- Functional Analyst—Lauren Gorgoglione
- Software Quality Assurance (SQA)—Matt Alderman
- Technical Writer—Thom Blom
- Security Engineer—Jack Michalek
- Release Mangers—Mike Palmer and Lewis Tillis

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# Orientation



## How to Use this Manual

Throughout this manual, advice and instructions are offered regarding the use of the RPC Broker V. 1.1 and the functionality it provides for Veterans Health Information Systems and Technology Architecture (VistA) software products.

There are no special legal requirements involved in the use of the RPC Broker.

This manual uses several methods to highlight different aspects of the material:

- Various symbols are used throughout the documentation to alert the reader to special information. The following table gives a description of each of these symbols:

Symbol	Description
	<b>NOTE/REF:</b> Used to inform the reader of general information including references to additional reading material
	<b>CAUTION or DISCLAIMER:</b> Used to caution the reader to take special notice of critical information

**Table ii. Documentation symbol descriptions**

- Descriptive text is presented in a proportional font (as represented by this font).
- Conventions for displaying TEST data in this document are as follows:
  - The first three digits (prefix) of any Social Security Numbers (SSN) will begin with either "000" or "666."
  - Patient and user names will be formatted as follows: [Application Name]PATIENT,[N] and [Application Name]USER,[N] respectively, where "Application Name" is defined in the Approved Application Abbreviations document and "N" represents the first name as a number spelled out and incremented with each new entry. For example, in Kernel (KRN) test patient and user names would be documented as follows: KRNPATIENT,ONE; KRNPATIENT,TWO; KRNPATIENT,THREE; etc.

- Sample HL7 messages, "snapshots" of computer online displays (i.e., roll-and-scroll screen captures/dialogues), and computer source code, if any, are shown in a *non*-proportional font and enclosed within a box.

Also included are Graphical User Interface (GUI) Microsoft Windows images (i.e., dialogues or forms).

- User's responses to online prompts and some software code reserved/key words will be boldface.
- References to "<Enter>" within these snapshots indicate that the user should press the **Enter** key on the keyboard. Other special keys are represented within < > angle brackets. For example, pressing the **PF1** key can be represented as pressing <PF1>.
- Author's comments, if any, are displayed in italics or as "callout" boxes.



**NOTE:** Callout boxes refer to labels or descriptions usually enclosed within a box, which point to specific areas of a displayed image.

- Delphi/Object Pascal software code, variables, and file/folder names can be written in lower or mixed case. All Object Pascal reserved words are boldface.
- All uppercase is reserved for the representation of M code, variable names, or the formal name of options, field and file names, and security keys (e.g., the XUPROGMODE key).

## Commonly Used Terms

The following is a list of terms and their descriptions that you may find helpful while reading the RPC Broker documentation:


Term	Description
<b>Client</b>	A single term used interchangeably to refer to a user, the workstation (i.e., PC), and the portion of the program that runs on the workstation.
<b>Component</b>	A software object that contains data and code. A component may or may not be visible.   <b>REF:</b> For a more detailed description, please refer to the <i>Borland Delphi for Windows User Guide</i> .
<b>GUI</b>	The Graphical User Interface application that is developed for the client workstation.
<b>Host</b>	The term Host is used interchangeably with the term Server.
<b>Server</b>	The computer where the data and the RPC Broker remote procedure calls (RPCs) reside.

Table iii. RPC Broker—Commonly used terms



**REF:** Please refer to the "Glossary" for additional terms and definitions.

## How to Obtain Technical Information Online

Exported file, routine, and global documentation can be generated through the use of Kernel, MailMan, and VA FileMan utilities.



**NOTE:** Methods of obtaining specific technical information online will be indicated where applicable under the appropriate topic.

### Help at Prompts

VistA M Server-based software provides online help and commonly used system default prompts. Users are encouraged to enter question marks at any response prompt. At the end of the help display, you are immediately returned to the point from which you started. This is an easy way to learn about any aspect of VistA M Server-based software.

### Obtaining Data Dictionary Listings

Technical information about VistA M Server-based files and the fields in files is stored in data dictionaries (DD). You can use the List File Attributes option on the Data Dictionary Utilities submenu in VA FileMan to print formatted data dictionaries.



**REF:** For details about obtaining data dictionaries and about the formats available, please refer to the "List File Attributes" chapter in the "File Management" section of the *VA FileMan Advanced User Manual*.

## Assumptions About the Reader

This manual is written with the assumption that the reader is familiar with the following:

- VistA computing environment:
  - Kernel—VistA M Server software
  - Remote Procedure Call (RPC) Broker—VistA Client/Server software
  - VA FileMan data structures and terminology—VistA M Server software
- Microsoft Windows environment
- M programming language
- Object Pascal programming language.
- Object Pascal programming language/Borland Delphi Integrated Development Environment (IDE)—RPC Broker

This manual provides an overall explanation of configuring RPC Broker and the functionality contained in RPC Broker Version 1.1. However, no attempt is made to explain how the overall VistA programming system is integrated and maintained. Such methods and procedures are documented elsewhere. We suggest you look at the various VA home pages on the World Wide Web (WWW) and VA Intranet for a general orientation to VistA. For example, go to the Veterans Health Administration (VHA) Office of Information (OI) Health Systems Design & Development (HSD&D) Home Page at the following Intranet Web address:

<http://vista.med.va.gov/>

## Reference Materials

Readers who wish to learn more about the RPC Broker should consult the following:

- *RPC Broker Release Notes*
- *RPC Broker Installation Guide*
- *RPC Broker Getting Started with the RPC Broker Development Kit (BDK)*
- *RPC Broker Developer's Guide (online help)*
- *RPC Broker Systems Manual*
- *RPC Broker Technical Manual* (this manual)
- RPC Broker Home Page at the following Web address:

<http://vista.med.va.gov/broker/index.asp>

This site provides announcements, additional information (e.g., Frequently Asked Questions [FAQs], advisories), documentation links, archives of older documentation and software downloads.

VistA documentation is made available online in Microsoft Word format and in Adobe Acrobat Portable Document Format (PDF). The PDF documents *must* be read using the Adobe Acrobat Reader (i.e., ACROREAD.EXE), which is freely distributed by Adobe Systems Incorporated at the following web address:

<http://www.adobe.com/>



**REF:** For more information on the use of the Adobe Acrobat Reader, please refer to the *Adobe Acrobat Quick Guide* at the following Web address:

<http://vista.med.va.gov/iss/acrobat/index.asp>

VistA documentation can be downloaded from the Health Systems Design and Development (HSD&D) VistA Documentation Library (VDL) Web site:

<http://www.va.gov/vdl/>

VistA documentation and software can also be downloaded from the Enterprise VistA Support (EVS) anonymous directories:

- Albany OIFO                      ftp.fo-albany.med.va.gov
- Hines OIFO                        ftp.fo-hines.med.va.gov
- Salt Lake City OIFO            ftp.fo-slc.med.va.gov

- Preferred Method      [download.vista.med.va.gov](http://download.vista.med.va.gov)

This method transmits the files from the first available FTP server.



**DISCLAIMER:** The appearance of external hyperlink references in this manual does *not* constitute endorsement by the Department of Veterans Affairs (VA) of this Web site or the information, products, or services contained therein. The VA does *not* exercise any editorial control over the information you may find at these locations. Such links are provided and are consistent with the stated purpose of this VA Intranet Service.





# 1. Introduction

The RPC Broker Technical Manual" provides descriptive information and instructions on the use of the Remote Procedure Call (RPC) Broker (also referred to as "Broker") software within the VA's Veterans Health Information Systems and Technology Architecture (VistA) environment. This document is intended for systems managers—Information Resource Management (IRM) personnel who are responsible for implementing and maintaining this software, application programmers, and developers. It acquaints system managers with the utilities, software structure, and functionality of the RPC Broker system modules, including information about the routines and files that comprise this software. It also has information about the software's structure and recommendations regarding its efficient use. Additional information on installation, security, management features, and other requirements is also included.

## Product Overview

The RPC Broker is considered to be part of the infrastructure of VistA. It establishes a common and consistent foundation for communication between clients and VistA M Servers.

The RPC Broker is a bridge connecting the client application front-end on the workstation (e.g., Delphi GUI applications) to the M-based data and business rules on the server. It links one part of a program running on a workstation to its counterpart on the server. The client and the server can be, and most often are, written in different computer languages. Therefore, the RPC Broker bridges the gap between the traditionally proprietary VistA and COTS/HOST products.

### The RPC Broker includes:

- A common communications driver for the M server interface that handles the device-specific characteristics of the supported communications protocol.
- An interface component on the M server, separate from the communications driver, that interprets client messages, executes the required code, and eventually returns data to the communications driver.
- A common file on the M server that all applications use to store the information about the queries to which they respond (i.e., REMOTE PROCEDURE file [#8994]).
- The Client Agent application that runs on client workstations, supporting single signon.
- The TRPCBroker component for Delphi, enabling development of client applications that can communicate via the RPC Broker.
- A dynamic link library (DLL) that provides access to RPC Broker functionality for development environments other than Delphi.



## 2. Implementation and Maintenance

The "RPC Broker Installation Guide" provides detailed information regarding the installation of the RPC Broker. It also contains many requirements and recommendation regarding how the Broker should be configured. Be sure to read the Installation Guide before attempting to install the RPC Broker.

### Site Parameters

The following two areas of the Broker require site parameter review and configuration:

Functional Area	Documentation Reference
Broker Listeners	See the "RPC Broker Site Parameters File" section in the <i>RPC Broker Systems Manual</i> .
Single Signon	See the "Integrated Auto Signon For Multiple Users" section in the <i>RPC Broker Systems Manual</i> .

**Table 2-1. RPC Broker—Site parameter references**

### Performance and Scalability

Current performance statistics are limited. However, results indicate that the processing time and resources consumed by the Broker itself are minimal. The RPC Broker doesn't introduce any additional overhead to the messages sent between the client and the server.

The RPC Broker listener does not tend to get overloaded, because it jobs off incoming requests to another process and then keeps listening for another request. This action is only limited by the number of partitions the M configuration supports.



Performance should instead be measured at the application level to determine the amount of resources consumed by VistA client/server applications that use the Broker. Performance and scalability, from a site's point of view, have been impacted by the load introduced by application executing on the host system, as opposed to the load introduced by the RPC Broker itself.



### 3. Files

#### VistA M Server Files

The RPC Broker consists of a single global with two files. This chapter describes the RPC Broker files including the file number, file name, global location, and description of the files.

File #	File Name	Global Location	Description	Data w/ File	Data Setting
8994	REMOTE PROCEDURE	^XWB(8994,	<p>This file is used as a repository of server-based procedures (i.e., remote procedure calls [RPCs]) in the context of the Client/Server architecture. All RPCs used by any site-specific client/server application software using the RPC Broker interface must be registered and stored in this file. Applications running on client workstations can invoke (call) the RPCs in this file to be executed by the server and the results are returned to the client application. Each RPC is associated with an entry point (i.e., ROUTINE with optional TAG).</p> <p> <b>NOTE:</b> The RPC subfield (#19.05) of the OPTION file (#19) points to the RPC field (#.01) of the REMOTE PROCEDURE file (#8994).</p>	NO  <b>NOTE:</b> RPCs are distributed and installed as separate components during the installation of the RPC Broker.	NA
8994.1	RPC BROKER SITE PARAMETERS	^XWB(8994.1,	Site managers can use this file to configure and adjust many characteristics of an RPC Broker installation/implementation at a site.	NO	NA
8994.5	REMOTE APPLICATION	^XWB(8994.5,	This file was introduced as part of the Broker Security Enhancement (BSE) Project. It was released with RPC Broker Patch XWB*1.1*45. This file helps better secure remote user/visitor access to	NO	NA

File #	File Name	Global Location	Description	Data w/ File	Data Setting
			<p>Remote VistA M Servers initiated by RPC Broker-based GUI applications. Remote user/visitor access permits applications where users need to access a large number of sites and do so <i>without</i> requiring a separate Access and Verify code at each site.</p> <p>Once BSE is fully implemented, those RPC Broker-based applications that require remote/visitor access <i>must</i> have an entry in this file with a one-way hash of a secure phrase.</p> <p>Identification of an entry in the file is based on the application passing in the original phrase which is then hashed and used for a cross-reference lookup.</p> <p>The application must have at least one entry in the CALLBACKTYPE Multiple field (#1) indicating all of the following:</p> <ul style="list-style-type: none"> <li>• Connection type</li> <li>• Valid address for the authenticating server</li> <li>• Connection port number.</li> </ul> <p>This information is necessary for the Remote VistA M Server to directly connect the Authenticating VistA M Server to obtain the demographic information necessary to create or match the user/visitor entry in the NEW PERSON file (#200). The application will also specify the desired context option for the user/visitor. This will be given to the remote user/visitor instead of forcing the application to determine how to set this value.</p>		


File #	File Name	Global Location	Description	Data w/ File	Data Setting
			 <b>NOTE:</b> This will be a very small file, containing only entries for those applications that will use the Broker Security Enhancement (BSE) for remote visitor's access mechanism. The total number of entries should be well under 20.		

Table 3-1. RPC Broker—Files and globals

## Client Files

### End-User Workstation

..\Program Files\VISTA\Broker

Clagent.exe

Clagent.hlp

RPCTest.exe

RPCTest.hlp

..\WINDOWS\system32

Bapi32.dll

### Programmer Workstation

Files installed vary depending on BDK patch level, installation choices, and Delphi version. In general, files are placed in the following directories:

..\Program Files\VISTA\BDK32\D2 *(no longer supported)*

..\Program Files\VISTA\BDK32\D3 *(no longer supported)*

..\Program Files\VISTA\BDK32\D4 *(no longer supported)*

..\Program Files\VISTA\BDK32\D5

..\Program Files\VISTA\BDK32\D6

..\Program Files\VISTA\BDK32\D7

..\Program Files\VISTA\BDK32\Help

..\Program Files\VISTA\BDK32\Samples\RPCBroker\BrokerEx

..\Program Files\VISTA\BDK32\Samples\RPCBroker\SilentSignOn  
..\Program Files\VISTA\BDK32\Samples\SharedRPCBroker\BrokerEx  
..\Program Files\VISTA\BDK32\Samples\SharedRPCBroker\SilentSignOn  
..\Program Files\VISTA\BDK32\SharedBrokerDebugger  
..\Program Files\VISTA\BDK32\Source

Depending on the version(s) of Delphi you are running:

..\Program Files\Borland\Delphi5\Projects\Bpl\XWB\_R50.bpl  
..\Program Files\Borland\Delphi6\Projects\Bpl\XWB\_R60.bpl  
..\Program Files\Borland\Delphi7\Projects\Bpl\XWB\_R70.bpl



**NOTE:** On Programmer Workstations, if you are recompiling the BDK32, you will probably want to remove any .bpl files from the System32 directory. These files are in the (\$Delphi)\Projects\Bpl directory in D5, D6, and D7 (and the [\$Delphi]\Bin and [\$Delphi]\Lib directory in D4. The files in the System32 directory are usually earlier in the path, and therefore, interfere with newly compiled software.



## 4. Global Translation, Journaling, and Protection

### Translation

Translation is recommended for the sole RPC Broker global (i.e., ^XWB global). The ^XWB global has the potential to be read-intensive as more and more remote procedures are added to it in the future.

#### For Caché Systems

It is best to translate the global to a volume set other than ROU. In order for translation to take effect on Caché systems, Caché must be rebooted.



**REF:** Cookbook recommendations should also be consulted for suggestions regarding journaling, translation, and replication; the information here may not apply.

### Journaling

Journaling of this global is not required, since the ^XWB global, for the most part is static (except during the addition of new remote procedures).

### Protection

The following global protection should be set:

Global Name	Caché Protection
^XWB	Owner: RWD Group: N World: N Network: RWD

**Table 4-1. RPC Broker—Global information**



## 5. Routines

This chapter contains a list of the routines exported with the RPC Broker (and includes routines exported with the M2M Broker software, entries are shaded in the table). A brief description of the routines is provided.

Routine	Description
XWB2HL7	This routine contains various functions and procedures that are used by the Broker for Remote Data Views (RDV) via HL7.
XWB2HL7A	This routine contains various functions and procedures that are used by the Broker for Remote Data Views (RDV) via HL7.
XWB2HL7B	This routine contains various functions and procedures that are used by the Broker for Remote Data Views (RDV) via HL7.
XWB2HL7C	This routine contains various functions and procedures that are used by the Broker for Remote Data Views (RDV) via HL7.
XWB2HL7T	This routine contains various functions and procedures that are used by the Broker for Remote Data Views (RDV).
XWB45PO	This routine was released with RPC Broker Patch XWB*1.1*45. It contains various functions and procedures that are used by the Broker Security Enhancement (BSE) Project.
XWBBRK	This routine contains calls that are designed to parse the various attributes of the Broker messages. All of this information is used internally. In the case of large arrays sent by the client, the function BREAD is used to read in the variable length subscripts and values.
XWBBRK2	This routine is a continuation of XWBBRK. The main entry point (i.e., CAPI actually calls the application RPC.
XWBBRK3	This routine is a continuation of XWBBRK. The main entry point (i.e., CAPI) actually calls the application RPC.
XWBBRK4	This routine is a continuation of XWBBRK. The main entry point (i.e., CAPI) actually calls the application RPC.
XWBCAGNT	Server code for RPC Broker client agent application.
XWBDLOG	Debug Logging for Broker
XWBDRPC	This routine contains various functions and procedures that are used for deferred RPCs by the Broker for Remote Data Views (RDV).
XWBESSO	This routine gets a user's specifications. This is a special routine used by the Compensation And Pension Records Interchange (CAPRI)-specific RPCBroker component. It is <i>not</i> intended for distribution beyond the Host site for the DVBA Tiger Team.
XWBEXMPL	This routine is used to support the Broker Example application. The Broker Example application is used to test the RPC Broker connectivity, actions, and RPCs. It is distributed with the Broker.
XWBFM	This routine contains entry points used to interface to the VA FileMan database server.
XWBLIB	This routine contains various functions and procedures used by the Broker. It is best described as a library or depository.
XWBLIB1	New message send utilities.

<b>Routine</b>	<b>Description</b>
XWBM2MC	M2M Broker Client APIs.
XWBM2MEZ	This routine was released with RPC Broker Patch XWB*1.1*45. It contains various functions and procedures for M-to-M Broker server connections that are used by the Broker Security Enhancement (BSE) Project.
XWBM2MS	M2M Broker Server.
XWBM2MT	M2M Broker Example.
XWBPRS	RPC Broker Message Parser.
XWBPRS2	RPC Broker Message Parser.
XWBRL	M2M Broker Link Methods.
XWBRM	M2M Broker Server Request Manager. This routine was enhanced with RPC Broker Patch XWB*1.1*45 for the Broker Security Enhancement (BSE) Project.
XWBRMX	M2M Broker Server Request Manager.
XWBRPC	M2M Broker Server Message Request Handler (MRH).
XWBRPCC	M2M Broker Client Utilities.
XWBRW	Read/Write for Broker TCP.
XWBSEC	This routine contains various functions and procedures used by the Broker. Calls in this routine are used for client/server security.
XWBTCP	This routine contains functions and procedures used to control the Broker TCP/IP Listener process. Systems personnel can use calls in this routine to start, stop, and debug the Broker process.
XWBTCPC	This job is started for each Broker request. The Listener process (i.e., XWBTCPL) will receive a connection request from a client and then dispatch, using the M JOB command, XWBTCPC to manage the rest of the interaction.
XWBTCPL	This is the Broker Listener process. IRM starts this job. It remains running on a system listening for TCP/IP connection requests. Once a request is received, this routine will start a separate process to manage the rest of the connection, then returns to "listening" for a new request.
XWBTCPM	TCP/IP Process Handler.
XWBTCPM1	Support for XWBTCPM.
XWBTCPM2	Test WEB Service. This routine was enhanced with RPC Broker Patch XWB*1.1*45 for the Broker Security Enhancement (BSE) Project.
XWBUTL	M2M Programmer Utilities.
XWBVL	M2M Broker Server Link Utility.
XWBVLC	M2M Broker Client.
XWBVLL	M2M Broker Listener.
XWBZ1	This routine supports the RPC Broker V. 1.0 Echo application, which was used to test RPC Broker connectivity, actions, and APIs. Note: The Echo client application is not distributed in V. 1.1 of the RPC Broker; it is replaced by the RPCTest application.

**Table 5-1. RPC Broker—Routines**

## 6. Exported Options

The following options are exported with the RPC Broker:

Name	Menu Text	Type
XWB BROKER EXAMPLE	RPC BROKER PROGRAMMING EXAMPLE	Broker (Client/Server)
XWB LISTENER STARTER	Start All RPC Broker Listeners	Run Routine
XWB RPC TEST	RPC	Broker (Client/Server)

**Table 6-1. RPC Broker—Exported options**

Client/server applications are a new type of option (i.e., Type "B", Broker client/server options) in the OPTION file (#19). The user must have the client/server application option assigned to them as with any other assigned option in VistA. The client/server application will only run for those users who are allowed to activate it.



**NOTE:** The client/server application options will not be displayed in the user's menu tree.

### XWB BROKER EXAMPLE

This option supports the Broker Example demonstration program provided in the Broker Development Kit (BDK). Developers should assign this option to themselves, if they want to try out the Broker Example application. For programmers who have the XUPROGMODE security key, however, assigning this option to themselves is not necessary.

### XWB LISTENER STARTER

Modified by patch XWB\*1.1\*9.



**REF:** For information on this option, please refer to the *RPC Broker Systems Manual*.

### XWB RPC TEST

It is recommended that the XWB RPC TEST option be given to users running Broker-based VistA client/server applications. The RPCTEST.EXE program on the client workstation runs the RPC Broker Diagnostic Program. This tool can be used to verify and test the Broker client/server connection and signon process. It displays information about the client and the server and can be a useful debugging tool for IRM.

To enable remote troubleshooting by IRM for all users, you can put this option on the Common menu (i.e., System Command Options menu [XUCOMMAND]). This enables any user to run the RPCTEST.EXE program on their workstation at your request.

## Exported RPCs

The RPC Broker distributes the following remote procedure calls (RPCs):

XWB ARE RPCS AVAILABLE	XWB EXAMPLE GET LIST
XWB CREATE CONTEXT	XWB EXAMPLE SORT NUMBERS
XWB DEFERRED CLEAR	XWB EXAMPLE WPTXT
XWB DEFERRED CLEAR ALL	XWB GET BROKER INFO
XWB DEFERRED GETDATA	XWB GET VARIABLE VALUE
XWB DEFERRED RPC	XWB FILE LIST
XWB DEFERRED STATUS	XWB FILENAME CHECK
XWB DIRECT RPC	XWB IM HERE
XWB EGCHO BIG LIST	XWB IS RPC AVAILABLE
XWB EGCHO LIST	XWB REMOTE CLEAR
XWB EGCHO MEMO	XWB REMOTE GETDATA
XWB EGCHO SORT LIST	XWB REMOTE RPC
XWB EGCHO STRING	XWB REMOTE STATUS CHECK
XWB EXAMPLE ECHO STRING	XWB RPC LIST

## 7. Archiving and Purging

### Archiving

There are no software-specific archiving procedures or recommendations for the RPC Broker ^XWB global or the REMOTE PROCEDURE (#8994) and RPC BROKER SITE PARAMETERS (#8994.1) files.

### Purging

There are no software-specific purging procedures or recommendations for the RPC Broker ^XWB global or the REMOTE PROCEDURE (#8994) and RPC BROKER SITE PARAMETERS (#8994.1) files.





## 8. Callable Routines

The RPC Broker does *not* provide any callable M routines. However, other programming interfaces are provided (e.g., Delphi components, DLL, Pascal functions, and RPCs).



**REF:** For information on these other programming interfaces, please refer to the "External Interfaces" chapter in this manual.



## 9. External Interfaces

The following external interfaces to RPC Broker functionality are provided:

### RPC Broker Components

Version 1.1 of the RPC Broker (fully patched) provides programmers with the capability to develop new VistA client/server software using the following RPC Broker Delphi components in the 32-bit environment (listed alphabetically):

- TCCOWRPCBroker
- TRPCBroker (original component)
- TSharedBroker
- TSharedRPCBroker
- TXWBRichEdit



**NOTE:** These RPC Broker components wrap the functionality of the Broker resulting in a more modularized and orderly interface. Those components derived from the original TRPCBroker component, inherit the TRPCBroker properties and methods.

These RPC Broker components (with the exception of TXWBRichEdit) provide all functionality needed for client applications to communicate with VistA M servers via the RPC Broker. All of these components are compatible with Borland Delphi V. 5.0 and greater.



**NOTE:** Delphi V.2.0, 3.0, and 4.0 are no longer supported. Delphi V.2.0 was supported prior to patch XWB\*1.1\*4, Delphi V. 3.0 was supported prior to XWB\*1.1\*13, and Delphi V. 4.0 was supported prior to XWB\*1.1\*40.



**CAUTION:** This statement defines the extent of support relative to use of Delphi. The Office of Information (OI) will support the Broker Development Kit (BDK) running in the currently offered version of Delphi and the immediately previous version of Delphi. This level of support became effective 06/12/2000.

Sites may continue to use outdated versions of the RPC Broker Development Kit but do so with the understanding that support will not be available and that continued use of outdated versions will not afford features that may be essential to effective client/server operations in the VistA environment. An archive of old (no longer supported) Broker Development Kits will be maintained at:

<http://vista.med.va.gov/broker/archive.asp>



**REF:** For more information on the Broker components, please refer to the *RPC Broker Getting Started with the Broker Development Kit (BDK)* manual and *RPC Broker Developer's Guide* (BROKER.HLP, online help in the BDK).

## RPC Broker Dynamic Link Library (DLL)

The RPC Broker DLL (BAPI32.DLL) provides access to RPC Broker functionality for development environments other than Delphi.



**REF:** For more information on the RPC Broker DLL, please refer to the *RPC Broker Getting Started with the Broker Development Kit (BDK)* manual and *RPC Broker Developer's Guide* (BROKER.HLP, online help in the BDK).

## Pascal Functions

The following Pascal functions are provided by the TRPCBroker component:

- GetServerInfo function
- Splash Screen functions: SplashOpen and SplashClose
- Piece function
- Translate function
- Encryption functions: Decrypt and Encrypt



**REF:** For more information on these Pascal functions, please refer to the *RPC Broker Getting Started with the Broker Development Kit (BDK)* manual and *RPC Broker Developer's Guide* (BROKER.HLP, online help in the BDK).

## RPC Broker Remote Procedures

The following RPC is provided for use by developers:

- XWB GET VARIABLE VALUE



**REF:** For more information, please refer to the *RPC Broker Getting Started with the Broker Development Kit (BDK)* manual and *RPC Broker Developer's Guide* (BROKER.HLP, online help in the BDK).

## 10. External Relations

### Relationship to Other Software

The RPC Broker software has been developed to aid the VistA development community and Information Resources Management (IRM) and is considered to be part of the infrastructure of VistA. Other infrastructure products include VA FileMan, Kernel, and MailMan. The RPC Broker will be used by all client/server applications written as part of VistA. The RPC Broker fully integrates with VA FileMan V. 22.0 and Kernel V. 8.0.

It is possible that the use of RPCs will also be extended to *non*-client/server applications. In this case, the REMOTE PROCEDURE file (#8994) must be present for those applications to function correctly.

### Relationship with Kernel and VA FileMan

Before installing the RPC Broker, Kernel V. 8.0, Kernel Toolkit V. 7.3, and VA FileMan V. 22.0 must be in place and fully patched.

### Relationships with Operating Systems

On the client side, it was decided that the 32-bit Microsoft Windows environment would be the supported platform. Thus, the client portions of the RPC Broker are compatible with Microsoft Windows 95 or higher, and Microsoft Windows NT 3.5 or higher.

On the server side, the RPC Broker supports the following ANSI M environments:

- Digital Standard M (DSM) V6.3-031 for OpenVMS AXP or greater
- InterSystems Caché for NT and OpenVMS
- Greystone Technology MUMPS (GT.M) on Linux

### DBA Approvals and Integration Agreements (IAS)

**To obtain the current list of DBIAs that the RPC Broker is a custodian of:**

1. Sign on to the Forum system (forum.va.gov).
2. Go to the DBA menu.
3. Select the Integration Agreements menu.
4. Select the Custodial Package menu.
5. Choose the ACTIVE by Custodial Package option.
6. When this option prompts you for a package, enter RPC BROKER.
7. All current DBIAs for which the RPC Broker package is custodian are listed.

**To obtain detailed information on a specific integration agreement:**

1. Sign on to the Forum system (forum.va.gov).
2. Go to the DBA menu.

3. Select the Integration Agreements menu.
4. Select the Inquire option.
5. When prompted for "INTEGRATION REFERENCES", enter the integration agreement number of the DBIA you would like to display.
6. The option then lists the full text of the DBIA you requested.

**To obtain the current list of DBIAs that the RPC Broker is a subscriber to:**

1. Sign on to the Forum system (forum.va.gov).
2. Go to the DBA menu.
3. Select the Integration Agreements menu.
4. Select the Subscriber Package menu.
5. Choose the Print ACTIVE by Subscribing Package option.
6. When prompted "START WITH SUBSCRIBING PACKAGE", enter RPC BROKER (in uppercase). When prompted "GO TO SUBSCRIBING PACKAGE", enter RPC BROKER (in uppercase).
7. All current DBIAs to which the RPC Broker package is a subscriber are listed.

## 11. Internal Relations

No options in the RPC Broker product assume that the entry/exit logic of another option has already occurred.





## 12. Software-wide Variables

The RPC Broker does *not* create any software-wide variables that have received Programming Standards and Conventions Committee (SACC) exemptions.



# 13. Software Product Security

## Security Management

There are no special legal requirements involved in the use of the RPC Broker product.

## Mail Groups and Alerts

There are no mail groups exported or alerts associated with the RPC Broker software.

## Remote Systems

### Connections

The M server process of the RPC Broker allows connections from client applications. Connection by those client applications is subject to authentication as any normal logon requires. Client applications can use any remote procedure call (RPC) authorized to the application, if the application is authorized to the signed-on user. Data is typically exchanged between clients and the RPC Broker server. Clients can be anywhere on VA's TCP/IP network.

Encryption is used when a user's Access and Verify codes are sent from the client to the server.

In addition, an encryption API is provided for developer use in their own applications to encode and decode messages passed between client and server.

Security with the RPC Broker is a four-part process:

1. Client workstations must send a valid connection request to the M Server.
2. Users must have valid Access and Verify codes.
3. Users must be valid users of a VistA client/server application.
4. Any remote procedure call must be registered and valid for the application being executed.



**REF:** For more information regarding Broker security, please refer to Chapter 2, "Security," in the "RPC Broker Systems Manual."

## Remote Data Views

The RPC Broker can be used to facilitate invocation of Remote Procedure Calls on a remote server. Applications can use either XWB DIRECT RPC or XWB REMOTE RPC to pass:

- The desired remote server
- The desired remote RPC
- Any parameters for the remote RPC

The RPC Broker on the local server uses VistA HL7 as a vehicle to pass the remote RPC name and parameters to the remote server. VistA HL7 is used to send any results from the remote server back to the local server. The RPC Broker on the local server then passes the results back to the client application.



**NOTE:** XWB DIRECT RPC and XWB REMOTE RPC are available only on a controlled subscription basis.

## Interfaces

No *non-VA* products are embedded in or required by the RPC Broker software, other than those provided by the underlying operating systems.

## Electronic Signatures

There are no electronic signatures used within the RPC Broker software.

## Security Keys

There are *no* specific security keys exported with the RPC Broker software. However, to bypass security for development purposes, we recommend client/server application developers be assigned the XUPROGMODE security key.

All users assigned the XUPROGMODE security key can do the following:

- Run any Vista client/server application regardless of whether it is in their menu tree or not, and
- Access any RPC without regard to the application context.

## File Security

The RPC Broker establishes the following security over its files:

Number	Name	DD	RD	WR	DEL	LAYGO	AUDIT
8994	REMOTE PROCEDURE	@	@	@	@	@	@
8994.1	RPC BROKER SITE PARAMETERS	@	@	@	@	@	@
8994.5	REMOTE APPLICATION	@	@	@	@	@	@

**Table 13-1. RPC Broker—File security**



**REF:** For more information on these files, please refer to the "Vista M Server Files" topic in Chapter 3, "Files," in this manual.

## Official Policies

Modification of any part of the RPC Broker software is strongly discouraged.

Distribution of the RPC Broker software is unrestricted.

The VHA IT Architecture Statement of Direction for FY98 prescribes *"Use of Kernel Broker for client-server communication..."*

As per the Software Engineering Process Group/Software Quality Assurance (SEPG/SQA) Standard Operating Procedure (SOP) 192-039—Interface Control Registration and Approval (effective 01/29/01), application programmers *must* not alter any HealthVet Vista Class I software code.



**REF:** For more information on SOP 192-039—Interface Control Registration and Approval, please refer to the following Web address:

[http://vista.med.va.gov/SEPG\\_lib/Standard%20Operating%20Procedures/192-039%20Interface%20Control%20Registration%20and%20Approval.htm](http://vista.med.va.gov/SEPG_lib/Standard%20Operating%20Procedures/192-039%20Interface%20Control%20Registration%20and%20Approval.htm)



# Glossary

CLIENT	A single term used interchangeably to refer to the user, the workstation, and the portion of the program that runs on the workstation. In an object-oriented environment, a client is a member of a group that uses the services of an unrelated group. If the client is on a local area network (LAN), it can share resources with another computer (server).
COMPONENT	An object-oriented term used to describe the building blocks of GUI applications. A software object that contains data and code. A component may or may not be visible. These components interact with other components on a form to create the GUI user application interface.
DHCP	<b>Dynamic Host Configuration Protocol.</b>
DLL	<b>Dynamic Link Library.</b> A DLL allows executable routines to be stored separately as files with a DLL extension. These routines are only loaded when a program calls for them. DLLs provide several advantages: <ol style="list-style-type: none"><li>1. DLLs help save on computer memory, since memory is only consumed when a DLL is loaded. They also save disk space. With static libraries, your application absorbs all the library code into your application so the size of your application is greater. Other applications using the same library will also carry this code around. With the DLL, you don't carry the code itself, you have a pointer to the common library. All applications using it will then share one image.</li><li>2. DLLs ease maintenance tasks. Because the DLL is a separate file, any modifications made to the DLL will not affect the operation of the calling program or any other DLL.</li><li>3. DLLs help avoid redundant routines. They provide generic functions that can be utilized by a variety of programs.</li></ol>
GUI	<b>Graphical User Interface.</b> A type of display format that enables users to choose commands, initiate programs, and other options by selecting pictorial representations (icons) via a mouse or a keyboard.
ICON	A picture or symbol that graphically represents an object or a concept.
REMOTE PROCEDURE CALL	A remote procedure call (RPC) is essentially M code that may take optional parameters to do some work and then return either a single value or an array back to the client application.
SERVER	The computer where the data and the Business Rules reside. It makes resources available to client workstations on the network. In Vista, it is an entry in the OPTION file (#19). An automated mail protocol that is activated by sending a message to a server at another location with the "S.server" syntax. A server's activity is specified in the OPTION file (#19) and can be the running of a routine or the placement of data into a file.

USER ACCESS	<p>This term is used to refer to a limited level of access to a computer system that is sufficient for using/operating software, but does not allow programming, modification to data dictionaries, or other operations that require programmer access. Any of VistA 's options can be locked with a security key (e.g., XUPROGMODE, which means that invoking that option requires programmer access).</p> <p>The user's access level determines the degree of computer use and the types of computer programs available. The Systems Manager assigns the user an access level.</p>
USER INTERFACE	<p>The way the software is presented to the user, such as Graphical User Interfaces that display option prompts, help messages, and menu choices. A standard user interface can be achieved by using Borland's Delphi Graphical User Interface to display the various menu option choices, commands, etc.</p>
WINDOW	<p>An object on the screen (dialogue) that presents information such as a document or message.</p>



**REF:** For a comprehensive list of commonly used infrastructure- and security-related terms and definitions, please visit the ISS Glossary Web page at the following Web address:

<http://vaww.vista.med.va.gov/iss/glossary.asp>

For a comprehensive list of acronyms, please visit the ISS Acronyms Web site at the following Web address:

<http://vaww.vista.med.va.gov/iss/acronyms/index.asp>



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